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ABSTRACT

Although quality education is a concern in every field of study, science, mathematics, and technology have a special importance in this country. They make up one of the cornerstones on which our success as a nation is built. To maintain our strength and independence, skills in these fields cannot degenerate. President Reagan has said that the declining condition of science/mathematics education has become serious enough to compromise the nation's future ability to develop and advance our traditional industrial base, and to compete in international marketplaces. The problems are particularly severe at the secondary level where there is a growing shortage of qualified science/mathematics teachers at a time when efforts are under way to raise standards and increase enrollments. In response to these problems, dozens of bills have been introduced to Congress. What is more urgent, however, is the necessity to forge an effective partnership with states, local education authorities, and private industry so that each can do its part of the job to resolve the problems. Although the federal role must be a limited one, several initiatives have been proposed, including allocating funds to states as scholarships for individuals not currently qualified to teach science/mathematics. (JN)

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Statement of

T.H. Bell, Secretary of Education

Before the

Senate Committee on Labor and Human Resources

Subcommittee on
Education, Arts, and the Humanities

Science and Mathematics Education

March 9, 1983

Secretary Bell is accompanied by
Caro Cichowski, Acting Director, Special Education, Rehabilitation and Research Analysis Division

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SECRETARY T.H. BELL'S TESTIMONY
ON SCIENCE AND MATHEMATICS EDUCATION
BEFORE THE SENATE COMMITTEE ON LABOR AND HUMAN RESOURCES
SUBCOMMITTEE ON EDUCATION, ARTS, AND THE HUMANITIES

March 9, 1983

Chairman Hatch, Chairman Stafford, and Committee members. I appreciate this opportunity to appear before the Subcommittee on Education, Arts, and the Humanities to discuss science and mathematics education. I believe — and I know you share this view — that there are currently few topics in education which are more deserving of attention than this one.

Certainly quality in education is a concern in every field of study, and there is a pressing need to increase academic excellence at all levels. That is why I have created a National Commission on Excellence in Education to focus on the entire range of problems which face American education. The Commission's report will be published this Spring.

But science, mathematics, and technology have a very special importance in this country. They comprise one of the cornerstones on which our success as a nation is built. Our economic strength, our military strength, and our health and well-being depend to a very large degree on modern science and technology -- much of which has been developed by our own citizens. To maintain our strength and, indeed, our independence, we simply cannot afford to let our considerable skill in these fields degenerate.

The President, in his message last May to the National Academy of Sciences symposium on science education, and again in the State of the Union address, clearly and forcefully articulated this concern, saying that the declining condition of science and mathematics education has become serious enough to compromise the nation's future ability to develop

and advance our traditional industrial base, and to compete in international marketplaces.

The problems are particularly severe at the secondary school level where there is a growing shortage of qualified science and mathematics teachers at the very time when many States and localities are trying to raise standards and increase enrollments.

- In a recent survey, for example, 43 States reported a shortage of math teachers, 42 reported a shortage of physics teachers, and 38 a shortage of chemistry teachers.

Yet, the supply of new science and mathematics teachers is dwindling:

- According to data from the National Science Teachers Association, during the past decade there has been a 79% decline in the number of individuals preparing to teach mathematics, and a 64% decline in the number of individuals preparing to teach science.

As our current science and mathematics teachers retire or, in too many instances leave teaching for other fields, it is very, very difficult to find qualified replacements for them. The problem will grow into a crisis because of another trend in education: State and local school boards are raising high school science and math graduation requirements. For example, since 1980 nine States have decided to increase the graduation requirements in mathematics, while another ten are also considering that as an option.

Our current requirements for high school graduation are too low.

- For example, a 1983 survey showed that only fourteen States require two years of mathematics, and only three States require three years.

- Other data show that only 38% of seniors report taking more than two years of mathematics, and nearly 5% report taking no math at all. Only one-fourth report taking more than two years of science, while 8% have taken no science courses.

As boards raise the requirements to increase students' competence in mathematics and science, the need for teachers will expand at an alarming rate.

Also, twenty-seven State universities have recently increased entrance requirements or have study commissions reviewing admissions standards, and most of these requirements are in science and mathematics. For each additional course required of high school students, we will need tens of thousands of additional teachers. Yet we do not have enough science and math teachers to meet even today's demands.

During the next two days you will be receiving detailed testimony on different aspects of science and mathematics education, so I don't think it is necessary for me to describe the situation at greater length. Clearly, the problems are important ones. America is still the technological leader of the world, but as the President observed in his State of the Union address, "We must keep that edge, and to do so we need to begin renewing the basics, starting with our educational system."

In response to these problems, dozens of bills were introduced in the last session of Congress related to science and mathematics education. Ear'y in this session of the 98th Congress Senator Domenici introduced S. 248, the "National Mathematics and Science Excellence in Education Act of 1983." Senator Pell, Senator Stafford, and others have introduced S. 530, the "Education for Economic Security Act." H.R. 1310 was passed last week and has been sent to the Senate for consideration. Chairman Hatch, you have introduced the Administration's bill, S. 706, the "Science and Mathematics Teacher Development Act." I am pleased that so much interest has been expressed in this important area early in the session, and that your Committee, through these hearings, is focusing the attention of the Congress on the needs in science and mathematics education.

What is most urgent, in our view, is the necessity to forge an effective partnership with States, local education authorities, and private industry,

so that each can do its part of the job. The Federal role must be a limited one -- and not only in financial terms.

It is States and localities which set graduation requirements from high school -- not the Federal government. I feel strongly that these requirements need to be raised in many districts if America is to maintain its technological edge. I applaud the efforts of superintendents, principals, school board members, and others who have recognized this early on and have set a standard others would be well advised to follow.

It is local school officials — not the Federal government — who establish teacher salaries. Data collected by the Department's National Center for Education Statistics show that the average teacher salary, in constant dollars, fell considerably during the 1970s. Now this is a problem for education as a whole, but it is especially a problem in math and science because business and industry offer technically trained people so much more money than education offers.

Furthermore, it is leaders from business and industry — not the Federal government — who ought to be the first offering assistance to those educators who want to understand our rapidly changing world of work, in order to implement relevant educational programs based on that knowledge.

It is in this context that the Congress is considering new legislation. The Administration's bill focuses on what I believe is the most critical element of the problem -- the growing shortage of qualified science and mathematics teachers at the secondary level in grades nine through twelve. In brief, the program would work as follows. Funds will be allocated to the States by formula to be used for scholarships for individuals not currently qualified to teach science or mathematics. Up to $5000 may be used for each scholarship. Eligible individuals must already hold a

bachelor's degree, and must be able to become qualified to teach science or mathematics within one year. Prime candidates for these scholarships include teachers currently qualified in fields other than science or mathematics, and individuals with college degrees and interest and aptitude to teach high school math and science, but who need the academic preparation to do so. It is our intention to assist a large number of such individuals, and train them quickly. Our schools need these qualified teachers soon. That is why we would like to limit participation to individuals who are not now training to teach mathematics or science and who can qualify within one year.

In addition to the Department's initiative, the National Science Foundation is proposing to support activities in pre-college science and mathematics education. It is my understanding that the Senate Appropriations Committee is working with the National Science Foundation to develop an acceptable plan for use of fiscal year 1983 funds in science and mathematics education.

The proposed activities which I have described reflect this Administration's belief that there is an appropriate Federal role in science and mathematics education. Even with the budget restrictions under which we must labor in today's economy, we consider this problem of sufficient magnitude to justify an expenditure which we hope will be assisted by funds from State, local, and private sources.

But the Federal government cannot shoulder the entire burden. Because of our economic situation, we should be particularly careful not to enact new legislation which is excessively costly. Nor can we in Washington mandate solutions for States and localities, and so we must not pass new legislation which is overly complex and prescriptive.